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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,369	12/09/2003	Madhusudhana T. Subraya	GEMS 0234 PA (130123 CIP)	1368
27256	7590	05/31/2005	EXAMINER	
ARTZ & ARTZ, P.C. 28333 TELEGRAPH RD. SUITE 250 SOUTHFIELD, MI 48034			SONG, HOON K	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/707,369	Applicant(s) SUBRAYA ET AL.	
	Examiner Hoon Song	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 2, 6 and 7 is/are allowed.
- 6) ☐ Claim(s) 3-5 and 8-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Rogers et al. (US 6215852B1).

Regarding claim 10, Rogers teaches an x-ray tube window cooling assembly for an x-ray tube (figure 4) comprising at least one thermal receptor thermally (114) coupled to at least one electron collector body (84) and x-ray tube window (102), said at least one thermal receptor comprises at least one thermal exchange device (coolant).

Regarding claim 11, Rogers teaches said at least one thermal receptor further comprises at least one coolant circuit with a coolant inlet (112) and a coolant outlet (figure 4).

Regarding claim 12, Rogers teaches said at least one thermal exchange device is coupled to said at least one coolant circuit (112) and reducing temperature of a coolant passing through said at least one thermal exchange device (figure 4).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 13-17, 21-24 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rogers et al. (US 6215852B1) in view of Lu et al. (US 6430263B1).

Regarding claims 3, Rogers teaches an x-ray tube window cooling assembly for an x-ray tube comprising:

At least one electron collector body thermally coupled to an x-ray tube window and comprising:

At least one coolant circuit with a coolant inlet and a coolant outlet.

However Rogers fails to teach at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, said at least one thermal exchange device is contained within said at least one electron collector body;

Wherein at least a portion of said at least one thermal exchange device is curved.

Lu teaches an x-ray window cooling circuit having at least one thermal exchange device (42) coupled to at least one coolant circuit (46) and reducing temperature of a coolant passing through said at least one thermal exchange device, said at least one thermal exchange device (42) is contained within the cooling circuit;

Wherein at least a portion of said at least one thermal exchange device (42) is curved.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the cooling circuit of Rogers with the fins as taught by Lu, since the fins would further improve cooling efficiency.

Regarding claim 13, Roger teaches said at least one electron collector body is formed of a conductive metallic material (column 8 line 33).

Regarding claim 14, Roger teaches said at least one electron collector body is formed of copper (column 8 line 33).

Regarding claim 15, Roger teaches said at least one electron collector body comprises a first electron collector body and a second electron collector body (figure 4).

Regarding claims 16, Roger teaches said first electron collector body is coupled to a first side of said x-ray tube window (the body extending left from the window) and said second electron collector body is coupled to a second said of said x-ray tube window (the body extending right from the window) (figure 4).

Regarding claims 17, Roger teaches said at least one electron collector body is formed at least partially of a phase change material (column 9 line 12) .

Regarding claim 21, Roger teaches at least a portion (124) of said at least one thermal exchange resides within a cavity of said at least one electron collector body.

Regarding claim 22, Roger teaches said at least one thermal exchange device comprises at least one plenum (cooling channel).

Regarding claims 23-24, Lu teaches a plenum divided uniformly by at least one fin (42) (figure 3).

Regarding claim 27, said at least one thermal exchange device comprise: a first thermal exchange device (housing) and a second thermal exchange device (coolant) embedded in said first thermal exchange device (housing)

Regarding claim 28, Roger teaches coolant passing through said at least one coolant circuit is a high velocity coolant (column 4 line 31).

Regarding claim 29, Roger teaches said high velocity coolant is formed at least partially of a fluid selected from at least one of water and a dielectric liquid (column 4 line 31).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roger in view of Marechal et al. (US 6390187B1).

Regarding claim 25, Roger fails to teach said at least one thermal exchange device have a diameter that is less than or equal to approximately 3 mm.

Marechal teaches a heat exchanger having diameter of 1-4 mm (column 4 line 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the heat exchanger of Roger with the heat changer having the diameter as taught by Marechal, since the diameter of Marechal would maximize the heat transfer.

Claims 4-5, 8-9, 18-20 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rogers et al. (US 6215852B1) in view of Gershuni et al. (US 4976113)

Regarding claims 4, 5, 8-9, 18-20 and 26, Rogers teaches an x-ray tube window cooling assembly for an x-ray tube comprising:

At least one electron collector body thermally coupled to an x-ray tube window and comprising:

At least one coolant circuit with a coolant inlet and a coolant outlet (figure 4).

However Rogers fails to teach at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, at least a portion of said at least one thermal exchange device comprising a finless porous body.

Gershuni teaches a cooling circuit having a finless porous body or phase change device (8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the cooling circuit of Rogers with the finless porous body as taught by Gershuni, since porous body would further improve cooling efficiency.

#### ***Allowable Subject Matter***

Claims 1-2 and 6-7 are allowed over prior art.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 1 and 6-7, the prior art fails to teach an electron collector body having at least one coolant circuit and thermally couple to an x-ray tube wherein the collector body has a significantly large surface area that is disposed over and is

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approximately parallel with a target surface area, and is oriented to receive a significant amount of back-scattered electrons as claimed in independent claim 1.

Regarding claim 2, the prior art fails to teach a first electron collector body and a second electron collector body non-integrally formed each other and thermally coupled to an x-ray tube window and each having at least one coolant circuit with a coolant inlet and a coolant outlet and at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device as claimed in independent claim 2.

### ***Response to Arguments***

Applicant's arguments with respect to claims 3-5 and 8-29 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 8:30 AM - 5 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HKS

5/23/05  
HKS



DAVID V. BRUCE  
PRIMARY EXAMINER